

Major problem in semantics

In this month's Guest Comment (page 9) Lewis Branscomb has put his finger on a longstanding and bothersome problem that physicists and other scientists have avoided confronting. This is the prevalent notion that research efforts can be divided into two categories: basic research and applied research. The physics community has certainly acquiesced in the use of this distinction. Branscomb is suggesting that if we take a closer look at these labels we will conclude, in agreement with him, that the terms "basic" and "applied" have little real meaning and, worse, that their use tends to impede the doing of physics.

Further reflection enables one to argue that this dichotomy, as have other famous dichotomies such as particle versus wave or environment versus heredity, will disappear when we are able to recognize the fundamental duality in the situation. Thus for any piece of research, if we look hard enough, we find duality in both the motivating goals and the utility of the results. There are dualities in motivation whether we are looking at research by the brand-new PhD working at XYZ corporation on the properties of linoleum floor tile or by the tenured professor at a prestige university working on quantum field theory. If he is really doing physics, the young PhD, while striving to produce a more salable product, will also hope to learn something new that maybe he can publish a paper about. Likewise, the august professor undertakes his research with both a desire to uncover fundamental knowledge and an awareness of more mission-oriented considerations—the needs of his graduate students and his department, for example.

To demonstrate the duality in utility of research results we can look at the research published by the member societies of AIP. In the journals published by, say, the Optical Society of America or the American Vacuum Society, it is not difficult to find papers that could just as well have appeared in *Physical Review* and vice versa. To take a specific example, two papers recently appeared in *Physical Review A* and *Journal of Applied Physics*: Karl Longren and Stevens Johnson report finding a self-similar solution to a coupled set of nonlinear diffusion equations, and G.

F. Chapline has derived a Monte Carlo method for solving nonlinear radiation-transport problems. Can the reader tell which paper appeared in which journal?

The classic example of duality in the usefulness of research results is the famous "Rabi tree" ("Basic research in the Navy," Naval Research Advisory Committee, page 46, June 1, 1959), which shows the achievements and influence over a 30-year period of I. I. Rabi and his collaborators and students in the fields of molecular beams and magnetic resonance. At the date of publication 20 years ago this tree showed that these research efforts had produced not only three Nobel prizes within the Rabi group but also numerous practical devices such as atomic clocks and magnetometers.

The "applied" and "basic" labels have been especially popular in Washington with both the Administration and Congress. In the past, the acquiescence of the science community in dichotomizing research in this way has led to serious problems. Recall, for instance, the history of funding for the NSF. The latest potential problem is the suggestion that "applied" research programs be split off from NSF and placed under a newly created National Technology Foundation. This suggestion prompted Branscomb's thought-provoking Guest Comment in which he concludes that any attempt to split up the current organization of NSF into basic and applied programs would seriously weaken our national research effort. We agree that such major surgery makes as much sense as deliberately severing a person's corpus callosum just to isolate the functions of the right and left halves of his brain.

Regardless of what labels become attached to their work, research physicists are basically all doing physics and their efforts should, as much as possible, be viewed as a whole without the intrusion of artificial barriers. It is time we physicists and other scientists begin actively to reject misguided attempts to label our efforts as either more or less useful. All good research is useful—and in more than one way.

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